Curriculum Vitae

Rui Manuel Marques Fernandes da Costa, D.V.M., Ph.D.

Birth: 15th of July 1972, Guarda, Portugal

Office: Section on In-Vivo Neural Function
Laboratory for Integrative Neuroscience
NIAAA/NIH
5625 Fishers Lane, Room TS-20D, MSC 9411
Bethesda, MD 20892-9411
Tel : (301) 443 1196
Fax : (301) 480 0466
e-mail : costarui@mail.nih.gov

Research Interests

General goal

- Integrative approach to investigate the biological basis of behavior

Research areas

- Molecular, cellular, and systems mechanisms of learning and memory, especially of action learning - motor skill learning, action-outcome associations, habit formation and addiction.
- Across-level approach to study cognitive and sensorimotor disorders in mouse models - NF1, Cri-Du-Chat, PD, OCD.

Major Tools:

- Gene targeting in mice
- Neuronal ensemble electrophysiology in behaving mice
- Slice electrophysiology in mice
- Mouse behavioral analysis

Education

1997 to 2002 -	Ph.D. in Biomedical Sciences, GABBA Doctoral Program, University of California at Los Angeles, USA and Abel Salazar Biomedical Institute, University of Porto, Portugal
1990 to 1996 -	DVM, Faculty of Veterinary Medicine, Technical University of Lisbon, Portugal.

Academic Positions

2006 to present -	Chief, Section of In-Vivo Neural Function, Laboratory of Integrative Neuroscience, NIAAA, National Institutes of Health, MD, USA.
2002 to 2005 -	Postdoctoral Fellow, Dr. Miguel Nicolelis and Dr. Sid Simon laboratories, Department of Neurobiology, Duke University Medical Center, USA
1998 to 2002 -	Graduate Student, Dr. Alcino Silva's laboratory, Depts. of Neurobiology, Psychiatry and Psychology, UCLA, USA.
1997 to 2002 -	Graduated Program in Basic and Applied Biology – GABBA Abel Salazar Biomedical Institute, University of Porto, Portugal.
1996 and 1997 -	Guest researcher, Department of Animal Environment and Health Swedish University of Agricultural Sciences, Skara, Sweden.

Professional Positions

1996 to 1997 -	Technical Director, Aberekin Portugal Genetics and Nutrition in Dairy Cattle.
1996 -	Veterinary Specialty in Pathophysiology of Reproduction

Division of Animal Selection and Reproduction
Venda Nova, Lisbon, Portugal.

Honors and Awards

2004 to present -	Member of the Board of Directors of the American-Portuguese Biomedical Research Fund – APBRF, New York, USA.
2003 -	Ph.D. thesis finalist of the 2003 Donald B. Lindsley Prize in Behavioral Neuroscience from the Society for Neuroscience.
2003 to 2005 -	Philip Morris External Research Program Post-Doctoral Award, Maryland, USA, $70.000 - 2 years.
2002 to 2004 -	Post-Doctoral Fellowship from the Foundation for Science and Technology, Portugal, $60.000 - 2 years.
2001 to 2002 -	Young Investigator Award from the National Neurofibromatosis Foundation, New York, USA. $70.000 - 2 years.
2001 -	National Institute of Mental Health travel scholarship.
2001 -	NF Prize for Research Ideas from the National Neurofibromatosis Foundation, New York, USA.
1997 to 2001 -	Doctoral Fellowship from the Foundation for Science and Technology, Portugal, $75.000 - 4 years.
1994 to 1995 -	Erasmus Fellowship, Universitat Autónoma de Barcelona, Barcelona, Spain.
1993 -	Waltham Prize on Animal Nutrition.

Publications

Research papers

- Dzirasa, K., Ribeiro. S., **Costa, R.M.**, Santos, L.M., Lin, S.C., Grosmark, A., Sotnikova, T.D., Gainetdinov, R.R., Caron, M.G., Nicolelis M.A.L. (2006). Dopaminergic Control of Sleep-Wake States. **Journal of Neuroscience, In Press**.

- **Costa, R.M.**, Lin, S.C., Sotnikova, T.D., Cyr, M., Gainetdinov, R.R., Caron, M.G., Nicolelis M.A.L. (2006). Rapid alterations in corticostriatal ensemble coordination during acute dopamine-dependent motor dysfunction. **Neuron, In Press**.

- **Costa, R.M.,** Gutierrez, R., Kloth, A., Coelho, M.R.P., de Araujo, I.E., Gainetdinov, R.R., Caron, M.G., Nicolelis M.A.L., Simon, S.A. (2006). Dopamine levels modulate the updating of tastant values. **Genes, Brain and Behavior, In Press**.

- Nagy, V., Bozdagi, O., Matynia, A., Balcerzyk, M., Okulski, P., Dzwonek, J., **Costa, R.M.**, Silva, A. J., Kaczmarek, L., and Huntley G. W. (2006). Matrix metalloproteinase (MMP)-9 is required for hippocampal late-phase LTP and memory. **Journal of Neuroscience**, **26:** 1923-1934.

- **Costa, R.M.**, Liu, L., Nicolelis, M.A.L., Simon, S.A. (2005). Gustatory Effects of Capsaicin that are Independent of TRPV1 Receptors. Proc. ISOT XIV, **Chemical Senses, 30** S1:i198-i200.

- Israely, I., **Costa, R.M.**, Silva, A.J., Kosik, K., Liu, X. (2004). Deletion of the neural specific protein Delta-Catenin leads to severe cognitive and synaptic dysfunction. **Current Biology, 14(18):**1657-63.

- **Costa, R.M.*,** Cohen, D.*, Nicolelis M.A.L. (2004). Differential corticostriatal plasticity during fast and slow motor skill learning in mice. **Current Biology, 14(13):1124-34**.

- **Costa R.M.**, Honjo T., and Silva A.J. (2003). Learning and memory deficits in Notch mutant mice. **Current Biology**, **13 (15)**: 1348-54.

- Ajay A., **Costa R.M.**, Irvin D., Patel A., Hu H., Kornblum H., Silva A.J., O'Dell T., and Colicelli J. (2003). The RAS Effector RIN1 Modulates the Formation of Aversive Memories**. Journal of Neuroscience**, **23 (3)**: 748-757.

- **Costa, R.M.**, Federov, N.B., Kogan, J.H., Murphy, G.G., Stern, J., Ohno, M., Kucherlapati, R., Jacks, T. and Silva, A.J. (2002). Mechanism for the learning deficits in a mouse model of neurofibromatosis type 1. **Nature**, **415** (6871):526-30.

- Givogri M.I., **Costa R.M.**, Schonmann V., Howard S., Silva A.J., Campagnoni A.T., Bongarzone E.R. (2002) The Jagged/Notch pathway is critical for oligodendrocyte differentiation and myelination in vivo. **Journal of Neuroscience Research**, **67** (3):309-20.

- Ohno, M., Frankland, P.W., Chen, P.A., **Costa R.M.** and Silva A.J. (2001). Inducible pharmacogenetic approaches to the study of learning and memory. **Nature Neuroscience**, **4**, 1238-1243.

- **Costa, R.M.*,** Yang, T.*, Huynh, D.P., Pulst S.M., Viskochil, D.H., Silva, A.J. and Brannan, C.I. (2001). Learning deficits, but normal development and tumor predisposition, in mice lacking exon 23a of the Neurofibromatosis type I gene. **Nature Genetics**, **27**, 399-405.

- Mayntz, M. and **Costa, R.** (1998). Effect of pharmacologically induced changes of ejection on suckling in *Bos taurus*. **Physiology and Behavior**, **65** (1), 151-156.

- **Costa, R.**, Mayntz, M. and Sender, G. (1998). Changes of milk compounds and fatty acid composition during suckling meals and the effect of after-stimulation on fatty acid composition in cows' milk. A pre-study. **Milchwissenchaft**, **53** (8), 430-434.

Review papers

- **Costa, R.M.,** Drew, C. and Silva, A.J. (2005). To Remember or Notch to Remember. **Trends in Neurosciences, 28**, 429-35.

- **Costa, R.M.** and Silva, A.J. (2003). Mouse models of Neurofibromatosis type I: Bridging the GAP. **Trends in Molecular Medicine**, **9**, 19-23.

- Frankland, P.W., Ohno M., Takahashi, E., Chen, A.P., **Costa R.M.**, Kushner, S.A. and Silva, A.J. (2003). Synomics: Pharmacologically Regulated Induction of Silent Mutations (PRISM): Combined pharmacological and genetic approaches for learning and memory. **The Neuroscientist**, **9:**104-9.

- **Costa, R.M.** and Silva, A.J. (2002). Molecular and cellular mechanisms underlying the cognitive deficits associated with Neurofibromatosis type I. **Journal of Child Neurology**, **17**, 622-626.

- Silva, A.J., Elgersma, Y. and **Costa, R.M.** (2001). From genes to therapies: the role of animal models. **Clinical Neuroscience Research, 1,** 187-193.

- Silva, A.J., Elgersma, Y. and **Costa, R.M.** (2000). Molecular and Cellular Mechanisms of Cognitive Function: Implications for Psychiatric Disorders. **Biological Psychiatry**, **47,** 200-210.

Book Chapters and Monographs

- **Costa, R.M**,. and Silva, A.J. (2004). Learning Deficits associated with NF1: from models to therapies. *in* **Neurofibromatose: Clínica, Genética e Terapêutica** , Ed. Mauro Geller, Editora Guanabara Koogan SA, Rio de Janeiro, Brazil (Portuguese).

- **Costa, R.M**., Elgersma, Y. and Silva, A.J. (2003). Modeling cognitive disorders: from genes to therapies. *in* **Genetics and Genomics of Neurobehavioral Disorders**, Ed. Gene Fisch, Humana Press, Totowa, NJ, USA

- **Costa, R.M.** (2002). Molecular and cellular mechanisms of cognitive dysfunction in Neurofibromatosis type I. **Thesis**. Abel Salazar Biomedical Institute, University of Porto, Portugal.

Abstracts in International Conferences

- **R.M.Costa**; S.Lin; T.D.Sotnikova; R.R.Gainetdinov; M.G.Caron; M.A.L.Nicolelis (2005). Corticostriatal neuronal ensemble dysfunction during dopamine - related hyperkinesia and akinesia. Society for Neuroscience Abstracts, 35th Annual Meeting, Washington, DC, USA.
- I.Lev; **R.M.Costa**; M.A.L.Nicolelis; D.Cohen (2005). Neural interactions in the mouse striatum and motor cortex during motor skill learning. Society for Neuroscience Abstracts, 35th Annual Meeting, Washington, DC, USA.
- Y.Cui**; R.Costa**; Y.Elgersma; G.Murphy; I.Mody; A.Silva (2005). Learning disabilities in NF1: higher GABA release in hippocampal interneurons. Society for Neuroscience Abstracts, 35th Annual Meeting, Washington, DC, USA.
- C.Shilyansky; Y.Cui; W.Li; A.Matynia; **R.M.Costa**; R.A.M.Brown; D.J.Jentsch; A.J.Silva (2005). Role of neurofibromin in prefrontal cortex. Society for Neuroscience Abstracts, 35th Annual Meeting, Washington, DC, USA.
- **Costa, R.M.**, Sotnikova, T.D., Gainetdinov, R.R., Cyr, M., Caron, M.G., Nicolelis M.A.L. (2004). In-vivo assesment of corticostriatal neuronal activity during dopamine-related hyperactivity and akinesia in DAT-KO mice. Society for Neuroscience Abstracts, 34th Annual Meeting, San Diego, CA, USA.
- Cohen, D., **Costa, R.M.**, Nicolelis M.A.L. (2004). Differential plasticity in the mouse striatum and motor cortex during fast and slow motor skill learning. Society for Neuroscience Abstracts, 34th Annual Meeting, San Diego, CA, USA.
- Coelho, M.R.P., Gutierrez, R., **Costa, R.M.**, Gainetdinov, R.R., Caron, M.G., Simon, S.A., Nicolelis M.A.L. (2004). Alterations in voluntary licking behavior in hyperdopaminergic mice. Society for Neuroscience Abstracts, 34th Annual Meeting, San Diego, CA, USA.
- Drew, C.A., **Costa, R.M.**, Matynia, A., Weinmaster, G., Silva, A.J. (2004). Characterization of inducible Notch transgenic mice. Society for Neuroscience Abstracts, 34th Annual Meeting, San Diego, CA, USA.
- **Costa, R.M.**, Cohen, D., Nicolelis M.A.L. (2004). Cortico-striatal plasticity during motor skill learning in mice. 4th FENS Meeting, Lisbon, Portugal.
- **Costa, R.M.**, Cohen, D., Nicolelis M.A.L. (2004). In-vivo assessment of neuronal dysfunction in neurodegenerative disorders. Inaugural symposium, IINN, Natal, Brazil.

- Cohen, D., **Costa, R.M.**, Nicolelis M.A.L. (2004). Fast neural activity modulation in the mouse striatum and motor cortex during rotarod practice. Inaugural symposium, IINN, Natal, Brazil.
- Israely, I., **Costa, R.M.,** Silva, A.J., Kosik, K., Liu, X. (2004). The neuron-specific protein Delta-Catenin is essential for cognitive function. Inaugural Symposium, IINN, Natal, Brazil.
- **Costa, R.M.**, Cohen, D., Nicolelis M.A.L. (2003). Neuronal ensemble recordings in mouse models of Huntington's disease. Society for Neuroscience Abstracts, 33rd Annual Meeting, New Orleans, LA, USA.
- Cohen, D., **Costa, R.M.**, Nicolelis M.A.L. (2003). Modulation of neural activity in the mouse striatum during rotarod practice. Society for Neuroscience Abstracts, 33rd Annual Meeting, New Orleans, LA, USA.
- Israely, I., **Costa, R.M.**, Silva, A.J., Kosik, K., Liu, X. (2003). Delta Catenin is a neuron specific protein critical for synaptic and behavioral plasticity. Society for Neuroscience Abstracts, 33rd Annual Meeting, New Orleans, LA, USA.
- **Costa, R.M.**, Cohen, D., Nicolelis M.A.L. (2003). Chronic differential recording of neuronal activity in awake mice. 6th Learning and Memory Meeting, Cold Spring Harbor Laboratory, NY, USA.
- Israely, I., **Costa, R.M.**, Silva, A.J., Kosik, K., Liu, X. (2003). The neuron specific protein Delta Catenin is critical for synaptic plasticity and spatial learning. 6th Learning and Memory Meeting, Cold Spring Harbor Laboratory, NY, USA.
- Ajay A., **Costa R.M.**, Irvin D., Patel A., Hu H., Kornblum H., Silva A.J., O'Dell T., and Colicelli J. (2003). The RAS Effector RIN1 Modulates the Formation of Aversive Memories. 6th Learning and Memory Meeting, Cold Spring Harbor Laboratory, NY, USA.
- Y. Cui, **R.M. Costa**, A.J. Silva (2002). An heterozygous null mutation of the Nf1 gene affects the Ras-Mapk pathway during learning of cued and contextual conditioning. Society for Neuroscience Abstracts , 32nd Annual Meeting, Orlando, Florida, USA.
- Israely, **R.M. Costa**, A.J. Silva, K. Kosik, X. Liu (2002). The neuronal armadillo protein Delta Catenin is critical for spatial learning. Society for Neuroscience Abstracts , 32nd Annual Meeting, Orlando, Florida, USA.
- **Costa, R.M.**, Frankland, P.W., Shimizu, T., Wang,Y.-F., and Silva, A.J. (2002). Attentional deficits rescued by manipulations that decrease Ras signaling in a mouse model of Neurofibromatosis type I. Society for Neuroscience Abstracts , 32nd Annual Meeting, Orlando, Florida, USA.
- **Costa, R.M.**, Miyamoto, A., Kida, S., Honjo, T., Weinmaster, G., Silva, A.J. (2002). Role of the Notch pathway in adult brain function. Forum of European Neuroscience, Paris, France.
- **Costa R.M.**, Miyamoto A., Honjo T., Weinmaster G., Silva A.J. (2001). The Notch pathway is critical for adult brain function. Society for Neuroscience Abstracts , 31st Annual Meeting, San Diego, California, USA.
- **Costa R.M.**, Elgersma Y., Federov, N.B., Zhuo Y., Kogan J.H. Parada L. F., Silva A.J. (2001). Learning disabilities in NF1: molecular and cellular mechanisms. Keystone Symposia, Hippocampus: The integration of Molecular Mechanisms and Cognitive Function, Taos, New Mexico, USA.
- **Costa R.M.**, Yang T., Kogan J.H., Ohno M., Brannan C.I., Silva A.J. (2000). Molecular mechanisms of cognitive dysfunction in Neurofibromatosis type I. Society Neuroscience Abstracts , 30th Annual Meeting, New Orleans, Louisiana, USA.
- Federov, N.B., **Costa R.**, Silva A. (2000). Enhanced GABA inhibition and increased threshold for LTP induction in NF1 heterozygous mice. Society Neuroscience Abstracts, 30th Annual Meeting, New Orleans, Louisiana, USA.
- **Costa R.M.**, Kogan J.H., Ohno M., Cohen J., Silva A.J. (2000). The learning deficits of the mouse model of NF1 are rescued by decreased Ras activity. NNFF International Consortium for the Molecular Biology of NF1 and NF2, Aspen, Colorado, USA.

- Federov, N.B., **Costa R.M.**, Silva A. J. (2000). Enhanced GABA inhibition and increased threshold for LTP induction in NF1 heterozygous mice. NNFF International Consortium for the Molecular Biology of NF1 and NF2, Aspen, Colorado, USA.
- **Costa, R.M.*,** Yang, T.*, Huynh, D.P., Pulst S.M., Viskochil, D.H., Silva, A.J. and Brannan, C.I. (2000). Learning deficits but normal development and tumor predisposition in mice lacking exon 23a of the Neurofibromatosis type I gene. NNFF International Consortium for the Molecular Biology of NF1 and NF2, Aspen, Colorado, USA.
- Elgersma Y., Zhuo Y., **Costa R.M.**, Parada L. F., Silva A.J. (2000). Role of neuronal NF1 in learning and memory. NNFF International Consortium for the Molecular Biology of NF1 and NF2, Aspen, Colorado, USA.
- **Costa R.M.**, Elgersma Y., Yang T., Kogan J.H., Brannan C.I., Silva A.J. (2000). Molecular mechanisms of Cognitive dysfunction in Neurofibromatosis type I. Forum of European Neuroscience, Brighton, UK.
- **Costa, R.M.**, Yang, T., Huynh, D.P., Brannan, C.I. and Silva, A.J. (1999). Learning deficits in mice lacking the exon 23a of *Nf1*. Society for Neuroscience Abstracts, 29th Annual Meeting, Miami Beach, Florida, USA.
- **Costa, R.M.**, Yang, T., Kogan, J.H., Frankland P.W., Brannan, C.I. and Silva, A.J. (1999). Learning deficits in mice lacking the exon 23a of *Nf1*. Cold Spring Harbor Laboratory Meeting on Learning and Memory, CSHL, New York, USA.
- Mayntz, M. and **Costa, R.** (1996). The ontogeny of suckling behaviour in *Bos taurus*. 8th Nordic ISAE (International Society for Applied Ethology) Winter Meeting, Uppsala, Sweden.
- **Costa, R.** and Mayntz, M. (1996). Pharmacologically induced changes of the inflow-rate into the udder cistern in *Bos taurus* and their effect on suckling behaviour. 6th Crane Seminar on Parental Behavior, Swedish University of Agricultural Sciences, Skara, Sweden.

Symposia/Courses organized

2006-	Co-chair and co-organizer of the SFN Symposium "Dynamic Nature of Memory, 36th SFN Annual Meeting. Atlanta, GA, USA.
2004 -	Co-organizer an International workshop "Introduction to Rodent Behaviour Testing"**,** Institute for Molecular and Cellular Biology, Portugal.
2002 to present -	Co-organizer of the Annual Neurobiology Module, GABBA Graduate Program, University of Porto, Portugal.
2003-	Co-organizer of the Symposium "Neural Function and Repair", Oporto, Portugal
2002 -	Co-organizer of the Symposium "Memory: Integrating Molecules and Mind", Oporto, Portugal

Invited Lectures

Spetember 2006 -	International Meeting from the Japanese Society for Animal Cell Technology, Kyoto, Japan
June 2006 -	Symposium "Reward and decision making in cortico-basal ganglia networks", Lake Arrowhead, CA
May 2006 -	Wellcome Trust Centre for Human Genetics, University of Oxford, UK
May 2006 -	Conference "The evolution of human cognition and neuroscience: a dialogue between scientists and humanists", Foundation Les Treilles, France
December 2005 –	Gulbenkian Science Institute, Oeiras, Portugal
July 2005 –	NIAAA, National Institutes of Health, MD, USA
May 2005 –	Dept. of Neuroscience, Mount Sinai School of Medicine, New York, USA
May 2005 –	Dept. of Neurobiology, U Mass Medical School, MA, USA

March 2005 –	Center for Learning and Memory, UT Austin, Texas, USA
March 2005 –	Center for Neural Science, New York University, New York, USA
February 2005 –	Gulbenkian Science Institute, Oeiras, Portugal
February 2005 –	Dept. of Neurobiology, Yale University Medical School, New Haven, USA
September 2004 –	Institute for Molecular Medicine, Lisbon, Portugal
February 2004 –	PBS Department, Duke University, Durham, USA
June 2002 –	University College London, London, UK
May 2002 –	Cardiff University, Cardiff, Wales, UK
September 2001 –	University of Lisbon, Lisbon, Portugal
July 2001 –	Duke University, Durham, USA

Peer review functions

2004 to present -	Member of the Grant Peer Review Panel, Philip Morris External Research Program, Maryland, USA.
2000 to present –	Referee for specialty scientific journals such as Journal of Neuroscience, Biological Psychiatry, European Journal of Neuroscience, Applied Animal Behavior Science, Pharmacological Research, BMC Neuroscience, Pediatrics, etc.

Teaching Experience

March 2006 -	Lecturer of the Neurosciences Course**,** GABBA Graduate Program, University of Porto, Portugal.
January 2006 -	Course Lecturer**,** Doctoral Program in Experimental Biology and Biomedicine, University of Coimbra, Portugal.
May 2005 -	Lecturer of the Neurosciences Course**,** GABBA Graduate Program, University of Porto, Portugal.
May 2005 -	Lecturer of the Neurosciences Course**,** Gulbenkian Doctoral Program in Biomedicine, Gulbenkian Science Institute, Portugal.
September 2004 -	Open Lecturer for the Doctoral Program in Experimental Biology and Biomedicine, University of Coimbra, Portugal.
June 2004 -	Course Lecturer - Introduction to Rodent Behaviour Testing**,** Institute for Molecular and Cellular Biology, IBMC, Portugal.
May 2004 -	Instructor of the Neurosciences Course**,** GABBA Graduate Program, University of Porto, Portugal.
July 2003 -	Course Lecturer, Mouse Behavioral Analysis Course, Cold Spring Harbor
May 2003 -	Instructor of the advanced course Integrative Neuroscience: From Molecules to Mind**,** GABBA Graduate Program, University of Porto, Portugal.
July 2002 -	Course Lecturer, Advanced Course: Hormone-Dependent Organization of the Brain, University of Minho, Braga, Portugal.
July 2002 -	Course Lecturer, Mouse Behavioral Analysis Course, Cold Spring Harbor Laboratory, NY, USA.
April 2002 -	Instructor**,** GABBA Graduate Program, University of Porto, Portugal.
July 2000 -	Assistant Instructor, Mouse Behavioral Analysis Course, Cold Spring Harbor Laboratory, NY, USA.
February 2000 -	Instructor, Learning and Memory Section, Neurobiology Course, GABBA Graduate Program, University of Porto, Portugal.
April 2000 -	Educational Conference, California Chapter of the NF Foundation, Los Angeles, CA, USA.

Students and Fellows Mentored

2006 to present -	Christine White, Psychology, University of Michigan

2006 to present -	Samer Hijaz, Biomedical Engineering, Virginia Commonwealth University
2004 to 2005 -	Alexander Kloth, Biomedical and Electrical Engineering, Duke University
2004 -	Monica R. P. Coelho, Psychology and Neuroscience, Duke University

Advanced Courses

April 2004 -	MATLAB Fundamentals and Programming Techniques, Microtek Computer Labs, Raleigh, NC, USA
June 2001 -	The NEURON Simulation Environment, Supercomputer Center, UCSD, San Diego, CA, USA.
September 1996 -	Course on Pedagogic Strategies for Instruction Sponsored by the European Union, Portugal
April 1996 -	6th Crane Seminar on Parental Behavior, Swedish University of Agricultural Sciences, Skara, Sweden.